

Abstract

A process for obtaining bulk mono-crystalline gallium-containing nitride, eliminating impurities from the obtained crystal and manufacturing substrates made of bulk mono-crystalline gallium-containing nitride has been now proposed. According to the invention, the process for obtaining of mono-crystalline gallium-containing nitride from the gallium-containing feedstock in a supercritical ammonia-containing solvent with mineralizer addition is characterized in that the feedstock is in the form of metallic gallium and the mineralizer is in the form of elements of Group I and/or their mixtures, and/or their compounds, especially those containing nitrogen and/or hydrogen, whereas the ammonia-containing solvent is in the form of the mineralizer and ammonia, there are two temperature zones in each step of the process, and the feedstock is placed in the dissolution zone, and at least one mono-crystalline seed is deposited in the crystallization zone, and following the transition of the solvent to the supercritical state, the process comprises the first step of transition of the feedstock from the metallic form to the polycrystalline gallium-containing nitride, and the second step of crystallization of the gallium-containing nitride through gradual dissolution of the feedstock and selective crystallization of gallium-containing nitride on at least one mono-crystalline seed at the temperature higher than that of the dissolution of the feedstock, while all the vital components of the reaction system (including the feedstock, seeds and mineralizer) invariably remain within the system throughout the whole process, and consequently bulk mono-crystalline gallium-containing nitride is obtained. The invention relates also the the post-treatment (slicing, annealing and washing) of the thus obtained crystals.

The improved process and the bulk monocrystals obtained thereby are intended mainly for use in the field of opto-electronics.